

DETAILED ACTION

This office action is in response to the Amendment and Remarks filed 9/30/2009, in which claims 1-22 were presented for examination; claims 23-96 are withdrawn.

Response to Arguments

Applicant's arguments with respect to claims 1-22, particularly with regards to the newly amended limitation of claims 1 and 12, have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Independent claims 1 and 12 were amended to include "part of the map that has a highest percentage of non-traveled cells". The word "percentage" is not used in the originally filed disclosure. Applicant refers to paragraphs [130], [157], and [160] of the specification for support, however, the "highest percentage" is not found in the cited paragraphs. Instead, the original disclosure recites: "the highest density of uncleaned cells." Percentage is defined by Merriam-Webster's Dictionary as: a part of a whole expressed in hundredths; a share of winnings or profits;

an indeterminate part; or probability. Density is defined by Merriam-Webster's Dictionary as: the quality or state of being dense; the quantity per unit volume, unit area, or unit length; the distribution of a quantity per unit usually of space; and the degree of opacity of a translucent medium. The specification further describes looking "for a region with the lowest average status", however the "average status" described in the specification is not equivalent or synonymous to the common definitions of "percentage". The common definition of "percentage" does fall within the description of the original disclosure as the common definition does not fall within the common definitions of terms of the specification and the original disclosure does not offer further or alternative definitions.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1, 4-10, 12, and 15-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hulden, WO2002/075470, in view of Aldred, US 7,085,624.

(Claims 1 and 12) Hulden describes a method of operating and a robot cleaner comprising: a body including a cleaning unit (brush); at least one wheel coupled to the body (R and L wheel, figure 4); at least one motor operatively coupled to the at least one wheel (R- and L-wheel motor); at least one processor operatively coupled to the at least one motor (CPU); at least one input device operatively coupled to the at least one processor (transmitter); at least one sensor operatively coupled to the at least one processor (tilt switches, bumpers, hall sensors); and at least one memory device storing

a plurality of instructions which are executable by the at least one processor (RAM, FPROM, EEPROM);

(a) causing at least one wheel to move, wherein the wheel is coupled to a body including a cleaning unit (figure 4, abstract); (b) causing the body to travel on a surface along a travel path (pg 12, line 16- pg 13, line 6), the surface being definable by a plurality of cells (pg 5, lines 9-14); (c) during the traveling: (i) gathering data corresponding to each traveled cell and each non-traveled cell (pg 10, line 26- pg 11, line 2 and pg 12, line 27- pg 13, line 8); (ii) at least partially cleaning the traveled cells (pg 13, lines 3-5); and (iii) storing the data, the stored data representing a map (figure 5); (d) determining which part of the map has a non-traveled cell (pg 17, lines 15-20); and (e) using the map to calculate a travel path to the non-traveled cell (pg 12, line 27- pg 13, line 8); (f) using the map to determine if the travel path is free from obstructions (pg 17, lines 22-28, pg 19, lines 7-11); and (g) if path is obstructed, rotating the travel path by a predetermined number of degrees (pg 19, lines 11-14, pg 18, lines 1-8) and repeating steps (e)-(f) (pg 17, lines 22-28); and (h) if path is not obstructed, repeating steps (b)-(g) (pg 5, lines 17-20). While Hulden describes determining uncleaned cells and traveling to uncleaned cells, it does not specify determining and traveling to a part of a map that has a highest percentage of non-traveled cells. However, Aldred teaches an autonomous cleaning machine wherein the machine travels and maps the room, determines the area with the largest space of free space that are uncleaned, if so, the machine determines a route to the target start point to clean that area, cleans the area, updates the stored map, and predetermines whether free space, uncleaned areas, still

exist to repeat the process until the room is clean (figures 10, 11, column 11, lines 7-16). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Aldred with the invention of Hulden because searching and cleaning the largest uncleaned portions of a room first decreases potential overlap and generally allows the cleaning machine to clean the most used areas first over smaller corners and restricted areas. It would have been further very obvious to one of ordinary skill to convert the numerical value of size to a percentage amount of the originally scanned area for ease of comparison in determining which area is larger.

(Claims 4 and 15) Hulden further describes wherein the map is composed of cells (pg 5, lines 9-14).

(Claims 5 and 16) Hulden further describes wherein the cells are marked as obstacles, cleaned or uncleaned (pg 13, lines 4-6).

(Claims 6 and 17) Hulden further describes wherein the map is composed of cells and a width of a cell corresponds to portion of effective cleaning unit width of the robot cleaner (pg 15, line 22- pg 16, line 3).

(Claims 7 and 18) Hulden further describes wherein the map is composed of cells and wherein a cell can be set cleaned with a single straight line path segment of robot cleaner (pg 15, line 22- pg 16, line 3).

(Claims 8 and 19) Hulden further describes wherein the map is a room map (pg 20, lines 7-16).

(Claims 9 and 20) Hulden further describes wherein the map contains information about a region being cleaned (pg 18, line 22- pg 19, line 5).

(Claims 10 and 21) Hulden further describes wherein information of the map is cleared after the region is cleaned (pg 18, line 22- pg 19, line 5, pg, 13, line 27- pg 14, line 8).

. Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 2, 11, 13 and 22 rejected under 35 U.S.C. 103(a) as being unpatentable over Hulden in view of Aldred, and in further view of Kurtzberg, US 6,167,332.

(Claims 2 and 13) Hulden in view of Aldred describes wherein the map is composed of a plurality of cells, but does not describe wherein the internal map is a subgrid. However, Kurtzberg teaches a method of navigation for an autonomous vehicle, including the surface area which the vehicle is to travel, the map, is defined by a plurality of cells (figures 6 and 8), wherein the map is a subgrid map (figure 6, local grid).

(Claims 11 and 22) Kurtzberg further teaches wherein the map contains information about the region being traversed (column 3, lines 49-53); and wherein a new map is prepared for the next region to be traversed (column 3, lines 54-65). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Hulden because the mapping teachings of Kurtzberg lower the operational costs of navigating through a large area (column 1, lines 56-65).

Claim Rejections - 35 USC § 103

Claims 3 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hulden in view of Aldred and Kurtzberg as applied to claims 2 and 13 above, and further in view of Okumura, US 4,674,048.

Hulden describes wherein the robot moves first forward if there is a free cell and then by default attempts to turn left (pg 19, lines 7-14) but does not describe wherein a subgrid is cleaned in a serpentine clean. However, Okumura teaches a cleaning a mapped area comprising a plurality of cells, wherein the map is cleaned in a serpentine clean (column 5, lines 2-41). It would have been obvious to one of ordinary skill in that art at the time of the invention to combine the teachings of Okumura with the invention of Hulden in view of Aldred and Kurtzberg because, utilizing the serpentine movement efficiently covers the most cells in logical order and treating the closest unclean cells first.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTINE M. BEHNCKE whose telephone number is (571)272-8103. The examiner can normally be reached on 8:30 am- 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G. Black can be reached on (571) 272-6956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CMB

/Thomas G. Black/

Supervisory Patent Examiner, Art Unit 3661